When banks' shadow fades and shadow banking rises: Securitization and loan performance in China

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Shadow banking in China

- Chinese style shadow banking or banks' shadow: bank-led products "loan-like" for regulatory arbitrage
  - Since 2012, real estate firms and local government financing vehicles are constrained in bank loans by regulation.
  - Banks work with trust companies and securities firms to circumvent regulations and finance borrowers with "loan-like" products in the forms of entrusted rights, trusted rights and etc. (Chen et al., 2018)
  - City commercial banks are active in banks' shadow activities.
- Western style shadow banking: Securitization
  - China launched a pilot securitization program in 2005, but suspended it in 2008 (apparently the spiilover effect of U.S. subprime mortgage crisis) and resumed it in 2012.
  - Volume of bank securitization has increased from $40.8 billion in 2014 to $279 billion by 2021.
  - Underlying assets: mortgage loans, auto loans, business loans, and consumer loans.

banks' shadow fades and shadow banking rises in China

- Introduction of the New Asset Management Rule on April 27, 2018 :
  - Strict regulation on off-balance sheet "loan-like" business
  - Banks' shadow fades: As the end of 2019, China's shadow banking sector as defined broadly shrank to 84.8 trillion yuan ($12.98 trillion) from the peak of 100.4 trillion yuan in 2017. By a narrower definition the sector also declined by 12 trillion yuan to 39.14 trillion yuan. (China Banking and Insurance Regulatory Commission report)
- Exception in the Rule:
  - Securitzation is not subject to the Rule
  - Securitization (Western shadow banking) rises

Motivation

- Securitization as the core of shadow banking
  - Information frictions such as adverse selection / moral hazard in securitization (Pennacchi, 1988)
  - Ample evidence of adverse selection / moral hazard in the US mortgage markets
  - Implications for financial stability: Subprime Mortgage Crisis
- Numerous discussions on Chinese style shadow banking
  - Monetary policy and entrusted loans (Chen et al., 2018 AER), debt demand and trusted loans (Chen et al., 2020 JFE)
- Securization in China
  - A black box: Lack of microdata
  - Is there adverse selection / moral hazard in China's securitization market?

Preview of findings

- Using proprietary loan-level data from a city commercial bank, we find:
  - lower default risk and prepayment risk of securitized loans than loans remaining on a bank’s balance sheet, suggesting no adverse selection or moral hazard in the Chinese securitization market.
  - Liquidity pressure arising from the rapid expansion of assets is an important reason for the absence of adverse selection and moral hazard.
    - The sample bank (a median-sized regional bank) makes huge investments in bank’s shadow businesses such as non-standard assets and interbank assets.
  - Credit risk transfer has become the dominant motive since the introduction of the New Asset Management Rule
    - Default risk of securitized loans has significantly increased compared with that before the introduction of the New Asset Management Rule.

Position in the literature

- Securitization and loan performance
  - Most empirical studies using loan-level data focus on advanced economies (An et al., 2011; Berndt and Gupta, 2009; Keys et al., 2010; Agarwal et al., 2012; Elul, 2016; Begley and Purnanandam, 2017), especially the U.S. mortgage market, leaving little attention to securitization practices in emerging markets.
  - This paper fills the gap by exploiting loan-level data of both sold and retained loans in Chinese securitization markets.
- Shadow banking regulation
  - We confirm an unintended consequences of the New Asset Management Rule
  - The bank’s shadow has been curbed, while shadow banking arises.

Data and sample

- Loan-level data
  - A proprietary dataset of 21,125 consumer loans and small business loans from a regional bank in China between 2015 and 2021.
    - 13,448 unsecured consumer loans
    - 1,186 secured consumer loans
    - 388 unsecured small business loans
    - 6,103 secured small business loans
  - 11,082 loans are securitized as underlying assets for 4 privately-placed ABS issuances. Two ABS were issued in 2017, one in 2018, and one in 2019.
- Bank-level data
  - Financial data from the sample bank's annual reports for 2016 to 2021.

Empirical specifications

- Baseline regression

$$Risk_{it} = \beta ABS_i + \gamma \cdot \boldsymbol{controls_i} + \delta_t + \varepsilon_{it}$$

- Default risk: a dummy variable that equals 1 if the loan is classified as a nonperforming loan, and 0 otherwise.
- Prepayment risk: a dummy variable that equals 1 if the settlement date is earlier than the maturity date of the loan, and 0 otherwise.
- ABS: a dummy variable for securitized loan
- Controls:
    - interest rates (%), maturity, loan amount, collateral, loan types, types of interest rates, loan purpose, mode of repayment, and pricing benchmarks.
- No demographic info

Summary statistics

Panel A	N	Mean	SD	Min	Median	Max
Default risk	21125	0.126	0.332	0	0	1
Prepayment risk	18465	0.442	0.497	0	0	1
ABS	21125	0.525	0.499	0	1	1
Interest rate (%)	21125	11.34	3.827	3.96	12	16
Log amount	21125	12.862	1.347	10.309	12.612	16.524
Log maturity	21125	3.832	0.823	1.792	3.584	5.7

	Mean of securitized loans	Mean of held loans	Mean Difference
Default risk	0.080	0.176	-0.096***
Prepayment risk	0.201	0.740	-0.539***
Interest rate	13.502	8.955	4.547***
Log amount	12.170	13.626	-1.456***
Log maturity	3.531	4.164	-0.632***

Panel B Loan features	Categories	N of loans	Percent
Collateral	Secured loans	7,289	34.5
	Unsecured loans	13,836	65.5
Types of loans	Consumer loans	14,634	69.27
	Small business loans	6,491	30.73
Types of interest rates	Fixed interest rates	17,912	84.79
	Floating interest rates	3,213	15.21
Mode of Repayment	Lump sum loan repayment	136	0.64
	Bullet repayment with interest-only instalments	3,756	17.78
	Amortized loans with fixed principal payment	1	0
	Amortized loans with varied principal payment	17,232	81.57
Loan purpose	Decoration	13,437	63.61
	Capital turnover	382	1.8
	Purchase of operating equipments and goods	237	1.12
	Travelling	38	0.18
	Property redemption	136	0.64
	Others	6895	32.64
Pricing benchmarks	PBoC benchmark interest rate	1,520	7.2
	LPR	19,605	92.8

Baseline results

- Economically sizable effect:
  - The estimated coefficient of 0.185 (0.280) suggests that default (prepayment) risk is 18.5 (28.0) percent lower in the securitized loans compared to those held on the balance sheet.

	Default risk	Prepayment risk	Default risk	Prepayment risk
	(1)	(2)	(3)	(4)
ABS	-0.105***	-0.441***	-0.185***	-0.280***
	(0.037)	(0.053)	(0.030)	(0.035)
Interest rate			0.014***	-0.002
			(0.003)	(0.004)
Log amount			0.005	-0.009
			(0.007)	(0.010)
Log maturity			0.066***	0.225***
			(0.023)	(0.029)
Constant	0.181***	0.686***	-0.260**	-0.118
	(0.019)	(0.029)	(0.118)	(0.174)
Collateral FE	No	No	Yes	Yes
Loan type FE	No	No	Yes	Yes
Types of interest rates FE	No	No	Yes	Yes
Mode of Repayment FE	No	No	Yes	Yes
Loan purpose FE	No	No	Yes	Yes
Pricing benchmarks FE	No	No	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
N	21125	18465	21121	18460
R-squared	0.035	0.359	0.094	0.467

Robustness checks – probit & alternative default risk

- Probit estimations in columns (1)-(2) for binary dependent variables.
- Column (3): an alternative proxy for default risk by checking the status of write-off: equals one if the loan is written off, and zero otherwise.

	Probit		
	Default risk	Prepayment risk	Write-off
	(3)	(4)	(5)
ABS	-0.948***	-0.956***	-0.084***
	(0.173)	(0.172)	(0.028)
Constant	-3.100***	-4.996***	-0.378**
	(0.697)	(1.307)	(0.169)
Controls	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes
N	20948	15606	10810
R-squared	.1198	.2703	0.313

Robustness checks- PSM

	Nearest neighbors matching		Radius matching		Kernel matching	
	Default risk	Prepayment risk	Default risk	Prepayment risk	Default risk	Prepayment risk
	(1)	(2)	(3)	(4)	(5)	(6)
ABS	-0.237***	-0.396***	-0.260***	-0.400***	-0.270***	-0.412***
	(0.050)	(0.075)	(0.037)	(0.059)	(0.037)	(0.059)
Constant	-0.739***	-0.483	-0.639***	-0.340**	-0.768***	-0.415**
	(0.239)	(0.388)	(0.156)	(0.157)	(0.139)	(0.180)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	1405	1115	11521	9961	11252	9722
R-squared	0.138	0.287	0.147	0.178	0.152	0.181

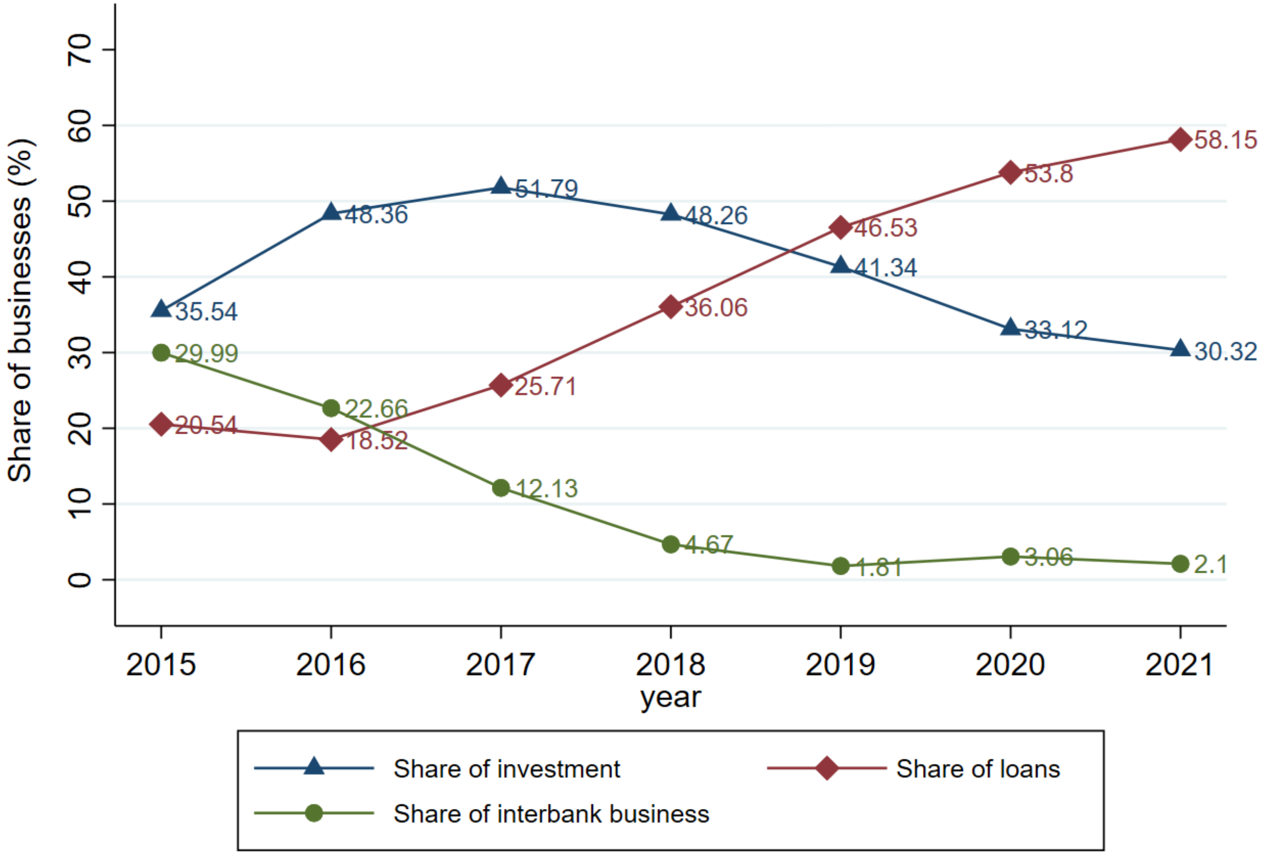
- Which loans are securitized are subject to the bank’s selection
- PSM based on loan characteristics

Motives for bank securitization and loan performance

- Three motives
  - Liquidity: sell loans with high quality and monitor borrowers properly ⇒no adverse selection or moral hazard
  - Credit risk transfer: sell loans with low quality and monitor borrowers improperly ⇒adverse selection or moral hazard
  - Capital regulation arbitrage⇒sell loans to save capital ⇒ uncertainty about adverse selection and moral hazard
- Why no adverse selection / moral hazard in Chinese securitization market?
  - Liquidity pressure > Credit risk transfer
- Introduction of the New Asset Management Rule
  - Liquidity pressure < Credit risk transfer

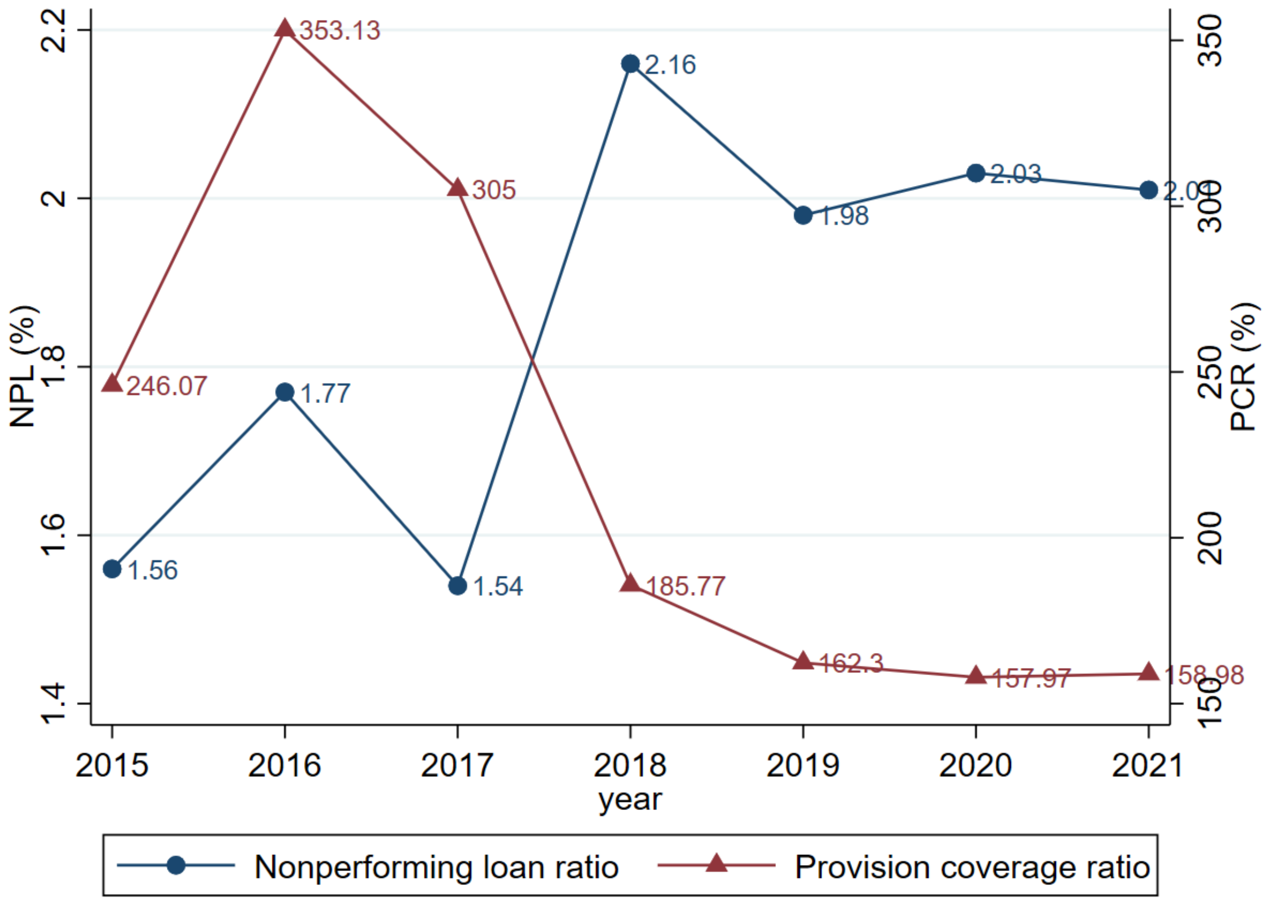
Dynamics of bank's asset structure

- Bank's shadow:
  - Investment + interbank business
- The share of investments had been increasing until 2017 and remained higher than that of loans until 2018. The share of investment was more than two times larger than that of loans.
- Since 2018, the sample bank drastically cut investment business but expanded credit. The share of investment plummeted from 48 percent to 30 percent, while the share of loans increased from 36 percent to 58 percent.



Dynamics of bank's NPL and PCR

- The credit risk of the sample banks has increased significantly since the beginning of 2018.
- Regulatory pressure on nonperforming loans and provisions incentivizes the bank to sell riskier loans to the secondary market.



Liquidity needs

- Three proxies for liquidity needs
  - Share of nonloans
  - Income share of nonloans
  - Asset growth
- Good loans are securitized when liquidity needs are strong

	Default risk (1)	Prepayment risk (2)	Default risk (3)	Prepayment risk (4)	Default risk (5)	Prepayment risk (6)
ABS	-0.097***	-0.222***	-0.009	-0.185***	-0.009	-0.185***
	(0.034)	(0.040)	(0.008)	(0.035)	(0.008)	(0.035)
ABS*High asset share of nonloans	-0.147***	-0.096**				
	(0.038)	(0.045)				
ABS* High income share of nonloans			-0.205***	-0.118**		
			(0.028)	(0.055)		
ABS*High asset growth					-0.205***	-0.118**
					(0.028)	(0.055)
Constant	-0.330***	-0.161	-0.308**	-0.143	-0.308**	-0.143
	(0.089)	(0.176)	(0.110)	(0.201)	(0.110)	(0.201)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	21121	18460	19652	17167	19652	17167
R-squared	0.101	0.469	0.099	0.473	0.099	0.473

New Asset Management Rules as a quasi-natural experiment

- The new rule prohibits risk offloading off-balance sheet in the bank's shadow activities
  - Securitization as a loophole allows credit risk transfer
- The bank incurred NPLs in loan business
  - Enhanced incentive to transfer credit risk
- Predictions
  - Higher default risk and lower prepayment risk in securitized loans

	Full sample		Securitized loans only	
	Default risk	Prepayment risk	Default risk	Prepayment risk
	(1)	(2)	(3)	(4)
ABS	-0.225***	-0.263***		
	(0.021)	(0.039)		
ABS*Post	0.105***	-0.046	0.088***	-0.068***
	(0.025)	(0.027)	(0.019)	(0.007)
Constant	-0.218**	-0.136	-0.771***	-0.463***
	(0.099)	(0.171)	(0.188)	(0.140)
Controls	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
N	21121	18460	11080	10191
R-squared	0.101	0.468	0.116	0.078

Robustness checks: Stricter NPL standard

- The CBRC requires that by the end of June 2018, state-owned banks must classify loans over 90 days past due as non-performing loans. By the end of June 2019, rural commercial banks must classify loans over 90 days past due as non-performing loans and may no longer classify them as special-mention loans.
- Is high default risk driven by changes in NPL standard?
- Remove loans in the sample that are more than 90 days past due but not recognized as non-performing loans

	Full sample		Securitized loans only	
	Default risk	Prepayment risk	Default risk	Prepayment risk
	(1)	(2)	(3)	(4)
ABS	-0.225***	-0.262***		
	(0.021)	(0.040)		
ABS*post	0.105***	-0.046	0.088***	-0.067***
	(0.025)	(0.028)	(0.019)	(0.006)
Constant	-0.217**	-0.125	-0.772***	-0.470***
	(0.098)	(0.170)	(0.187)	(0.144)
Controls	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
N	21076	18415	11053	10164
R-squared	0.101	0.470	0.116	0.081

Robustness checks: eliminate the impact of the COVID-19

	Full sample		Securitized loans only	
	Default risk	Prepayment risk	Default risk	Prepayment risk
	(1)	(2)	(3)	(4)
ABS	-0.312***	-0.404***		
	(0.020)	(0.042)		
ABS*post	0.086***	-0.039**	0.066***	-0.071***
	(0.012)	(0.013)	(0.009)	(0.007)
Constant	-0.435***	-0.364***	-0.330***	-0.331*
	(0.101)	(0.121)	(0.101)	(0.166)
Controls	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes
N	10144	9290	7374	7152
R-squared	0.176	0.197	0.026	0.033

- During Covid-19 pandemic, higher loan risk.
- Robustness check:
  - Drop loans matured after the inception of the Covid-19 pandemic and keep loans with a maturity date prior to October 23, 2019 (90 days before the national lockout) are retained

Regulatory arbitrage

- Regulatory pressure: LowCAR, HighNPL, LowPCR
- Stronger incentive to sell riskier loans through securitization in years when they face higher regulatory pressure on capital adequacy, NPL ratios, and loan loss provisioning.

	CAR		NPL		PCR	
	Default risk	Prepayment risk	Default risk	Prepayment risk	Default risk	Prepayment risk
	(1)	(2)	(3)	(4)	(5)	(6)
ABS	-0.254***	-0.334***	-0.214***	-0.303***	-0.254***	-0.334***
	(0.017)	(0.034)	(0.026)	(0.040)	(0.017)	(0.034)
ABS*Low CAR	0.154***	0.107**				
	(0.039)	(0.046)				
ABS*High NPL			0.205***	0.118**		
			(0.028)	(0.055)		
ABS*Low PCR					0.154***	0.107**
					(0.039)	(0.046)
Constant	-0.300***	-0.143	-0.308**	-0.143	-0.300***	-0.143
	(0.096)	(0.201)	(0.110)	(0.201)	(0.096)	(0.201)
Controls	Yes	Yes	Yes	Yes	Yes	Yes
Year-Quarter FE	Yes	Yes	Yes	Yes	Yes	Yes
N	19652	17167	19652	17167	19652	17167
R-squared	0.100	0.473	0.099	0.473	0.100	0.473

Conclusions

- No evidence of adverse selection or moral hazard in Chinese securitization market.
- After the introduction of the New Asset Management Rule
  - securitization motives have changed from liquidity pressure to credit risk transfer
  - securitized loans have a higher default risk than before

Policy implications

- An unintended consequence of the regulation
  - The new regulation curbs banks’ shadow, while allows the rise of shadow banking.
- Financial supervisors shall keep an eye on the securitization market.